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(54) **Call reception control method for digital mobile telephone**

(57) A call reception control method for a digital mobile telephone is provided which is capable of providing a stable and speedy call reception control even if an access defective channel exists such as maintenance restriction, position registration NG, and roaming inhibition network. The call reception control method for a digital mobile telephone for performing a call reception operation by receiving information from a base station and selecting one of a plurality of channels as a perch channel, comprises the steps of: adding, to the information from the base station, access defective information of each of the plurality of channels; receiving information from the channel selected from the plurality of channels; storing the access defective information of the channel in the received information into a memory; and selecting the perch channel in accordance with the access defective information stored in the memory.

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## Description

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

The present invention relates to a call reception control method for a digital mobile telephone and more particularly to a call reception control method for a digital mobile telephone capable of providing a stable and speedy call reception control.

## 2. Related Background Art

In a digital mobile telephone system, a mobile telephone receives radio waves from a base station and executes a predetermined operation. There are partially overlapped zones covered by a plurality of base stations distributed at various areas. If a mobile telephone is in the overlapped area of a plurality of zones, a zone transfer and a channel selection are executed for realizing communications with the optimum base station.

A zone transfer process of a conventional call reception control method for a digital mobile telephone is illustrated in Fig. 5. The zone transfer process will be described by using  $L0$  as a current reception level of a subject station slot of a mobile telephone contained in a super frame transmitted from a base station,  $L1$  to  $L_n$  (maximum level being  $\max(L_i)$ ) as a reception level of adjacent  $n$  zones,  $L_{tn}$  as a call reception permission level, and  $L_{th}$  as a call reception degradation level, and by setting a zone transfer level difference  $\Delta L$  to  $(L_{tn} - L_{th})$  or larger.

First, it is checked whether  $L0$  is smaller than  $L_{th}$  (Step S31), and if not, it is checked whether  $\max(L_i)$  is larger than  $(L0 + \Delta L)$  (Step S32). If larger, the call reception channel is selected, whereas if not larger, the flow returns to the process of Step S31. If  $L0$  is smaller than  $L_{th}$  at Step S31, it is checked whether  $\max(L_i)$  is larger than  $L_{th}$  (Step S33), and if larger the call reception channel is selected, whereas if not larger, a perch channel is scanned.

In a conventional call reception control method for a digital mobile telephone, even in a roaming inhibition network wherein the peripheral area of a presently waiting channel (cell) is under a maintenance restriction or the channel has received a position registration NG (position registration inhibition position number), it is judged from the RSSI level representative of the reception radio wave level of the base station whether a transfer to an adjacent channel is to be performed.

Therefore, if the RSSI level at an adjacent channel becomes larger than the RSSI level at the subject station by a preset value, it is judged that the quality has degraded, and the transfer to the adjacent channel is performed. However, under the above-described conditions, a call reception at the roaming site cannot be allowed so that the original channel resumes. At the original channel, however, the quality degradation

occurs like the case described above, and a hand-over phenomenon occurs which repeats transfer.

For example, as shown in Fig. 2, consider three zones partially overlapping, including another channel A zone unable to receive a call, a channel B zone with maintenance restriction, and a channel (cell) C zone able to receive a call. In this case, if the RSSI levels of the channels at a point Y are as shown in Fig. 4, the perch scan is executed to receive a call over the channel B. However, since the channel B has maintenance restriction and is registered as an inaccessible channel, the activation is shifted to the channel C having the next higher level. Since the RSSI level of the channel C is low, a transfer to the channel B is performed and a transfer operation is repeated. Therefore, the stable and speedy call reception control is impossible.

## SUMMARY OF THE INVENTION

It is an object of the present invention to provide a call reception control method for a digital mobile telephone capable of providing a stable and speedy call reception control even if an access defective channel exists such as maintenance restriction, position registration NG, and roaming inhibition network.

In order to solve the above problem, the present invention provides a call reception control method for a digital mobile telephone for performing a call reception operation by receiving information from a base station and selecting one of a plurality of perch channels as a reception (awaiting) channel, the call reception method comprising the steps of: adding, to the information from the base station, access defective information of each of the plurality of channels; receiving information from the channel selected from the plurality of channels; storing the access defective information of the channel in the received information into a memory; and selecting the perch channel in accordance with the access defective information stored in the memory.

The selected channel is a channel selected from the plurality of channels in the order of higher reception level. The access defective channel is a channel with maintenance restriction, a channel received a position registration NG, or a roaming inhibition network.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a flow chart illustrating an operation procedure of the call reception control method for a digital mobile telephone according to an embodiment of the present invention.

Fig. 2 is a diagram illustrating a particular operation of the call reception control method for a digital mobile telephone of the embodiment.

Fig. 3 is a diagram illustrating a particular operation of the call reception control method for a digital mobile telephone of the embodiment.

Fig. 4 is a diagram illustrating a particular operation of the call reception control method for a digital mobile

telephone of the embodiment and a conventional case.

Fig. 5 is a flow chart illustrating a conventional zone transfer process for a digital mobile telephone.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the invention will be described with reference to the accompanying drawings.

In this embodiment, a memory of a mobile telephone can store various information of all perch channels, and the call reception control is executed to obtain an optimum perch in accordance with the stored information. The various information is information representative of a channel validity. For example, the information includes a valid channel, a channel with a network number not registered in ID, a channel which cannot be synchronized, a channel with a level insufficient for call reception, and a channel with restriction (access defective channel).

When the power to the mobile telephone is turned on, all perch channels are first dealt as valid. After the perch scan, the perch channel is activated (synchronized) starting from the channel having a highest RSSI level. If the network number in the broadcast information of the first activated channel does not coincide with the ID information (accessible network number) of the mobile telephone, the mobile telephone stores this perch channel in a memory to indicate that the channel is access defective, and thereafter, the channel having the next highest RSSI level is activated. If the information (broadcast information) of the activated channel coincides with the ID information of the mobile telephone, the mobile telephone enters a call reception state.

As the mobile telephone enters the call reception state, the radio wave intensity (RSSI level) of adjacent channels of the presently waiting channel is measured in response to an instruction (broadcast information) from the network. In this case, there is a possibility that the adjacent channels may include the previously activated channels. However, these channels have been stored in the memory as access defective channels so that the quality of the mobile telephone relative to these channels is not degraded.

If the mobile telephone moves and the RSSI level of the adjacent channel becomes stronger than the presently waiting channel, the quality of the mobile telephone is degraded because the channel is not still stored in the memory, and the channel is activated. The information of the channel is compared with ID of the mobile telephone, and if it is judged that the channel is unable to receive a call, the mobile telephone stores the channel in the memory as the new access defective channel, and the previously waiting channel is again activated to enter a call reception state. In this manner, the mobile telephone can always capture an optimum channel capable of receiving a call.

A particular operation of the call reception method

for a digital mobile telephone according to the embodiment of the invention will be described with reference to Figs. 2 to 4.

Referring to Fig. 2, if the RSSI levels at an X point have the relationship shown in Fig. 3, the mobile telephone first activates the channel A. However, since the channel A is another channel unable to receive a call, this channel is stored in the memory as an access defective channel, and the channel C having the next higher RSSI level is activated. Since the channel C can receive a call, the mobile telephone enters the call reception state at this channel C.

Next, as the mobile telephone moves from the point X to the point Y, and if the RSSI levels have the relationship shown in Fig. 4, the mobile telephone activates the channel B having the highest level. However, since the channel B is the access defective channel, it is stored in the memory as the access defective channel, and then the channel C having the next higher level is activated. Since the channel B is being stored in the memory as the access defective channel, the mobile telephone enters the call reception state at this channel C even if the RSSI level difference between the channels B and C is a zone transfer level difference or larger.

Fig. 1 is a flow chart illustrating an operation procedure of the call reception control method for a digital mobile telephone of the embodiment.

After the power is turned on, initialization is first performed (Step S1), a perch scan is executed (Step S2), and a table is generated for storing access defective information by scanning each perch channel in the order of stronger radio wave (higher RSSI level) (Step S3). Next, it is checked if there is any channel capable of being activated (Step S4). If not, the flow returns to the process of Step S2, whereas if there is any channel, this perch channel is activated (Step S5) and it is checked if the activation is successful (Step S6). If successful, it is checked whether the network number has been registered or not (Step S7). If registered, it is judged whether the perch channel can receive a call (without maintenance restriction) (Step S8).

If not successful at Step S6, if it is judged at Step S7 that the network number has not been registered, or if it is judged at Step S8 that a call cannot be received, the information to these effects are registered in an error table (Step S9), and it is checked whether there is any channel to be again activated. If not, the flow returns to the process of Step S4, whereas if there is any channel or if it is judged at Step S8 that a call can be received, a call reception channel is activated at Step S11.

After the process of Step S11, the levels of the adjacent channels start being measured (Step S12), and an intermittent call reception operation is activated (Step S13). In this state, any occurrence of quality degradation is monitored (Step S14), and if a quality degradation occurs, the waiting channel is registered as a channel to be again activated (Step S15). It is next checked whether a channel with quality degradation is being registered in the error table (Step S16), and if reg-

istered, the flow returns to the process of Step S11, whereas if not registered, the flow returns to the process of Step S5.

As described so far according to the call reception control method for a digital mobile telephone of this invention, a wasteful hand-off occurs less so that a speedy call reception is possible. Furthermore, since the mobile telephone is always in a stable state, the call reception factor can be improved. Still further, maintenance works can be performed without any fear at the area where there are adjacent channels (cells), and so the maintenance of a network can be improved considerably.

#### Claims

1. A call reception control method for a digital mobile telephone for performing a call reception operation by receiving information from a base station and selecting one of a plurality of channels as a perch channel, the call reception method comprising the steps of:
  - adding, to the information from the base station, access defective information of each of the plurality of channels;
  - receiving information from the channel selected from the plurality of channels;
  - storing the access defective information of the channel in the received information into a memory; and
  - selecting the perch channel in accordance with the access defective information stored in the memory.
2. A call reception control method according to claim 1, wherein said selected channel is a channel selected from the plurality of channels in the order of higher reception level.
3. A call reception control method according to claim 1, wherein said access defective channel is a channel with maintenance restriction, a channel received a position registration NG, or a roaming inhibition network.
4. A call reception control method according to claim 2, wherein said access defective channel is a channel with maintenance restriction, a channel received a position registration NG, or a roaming inhibition network.

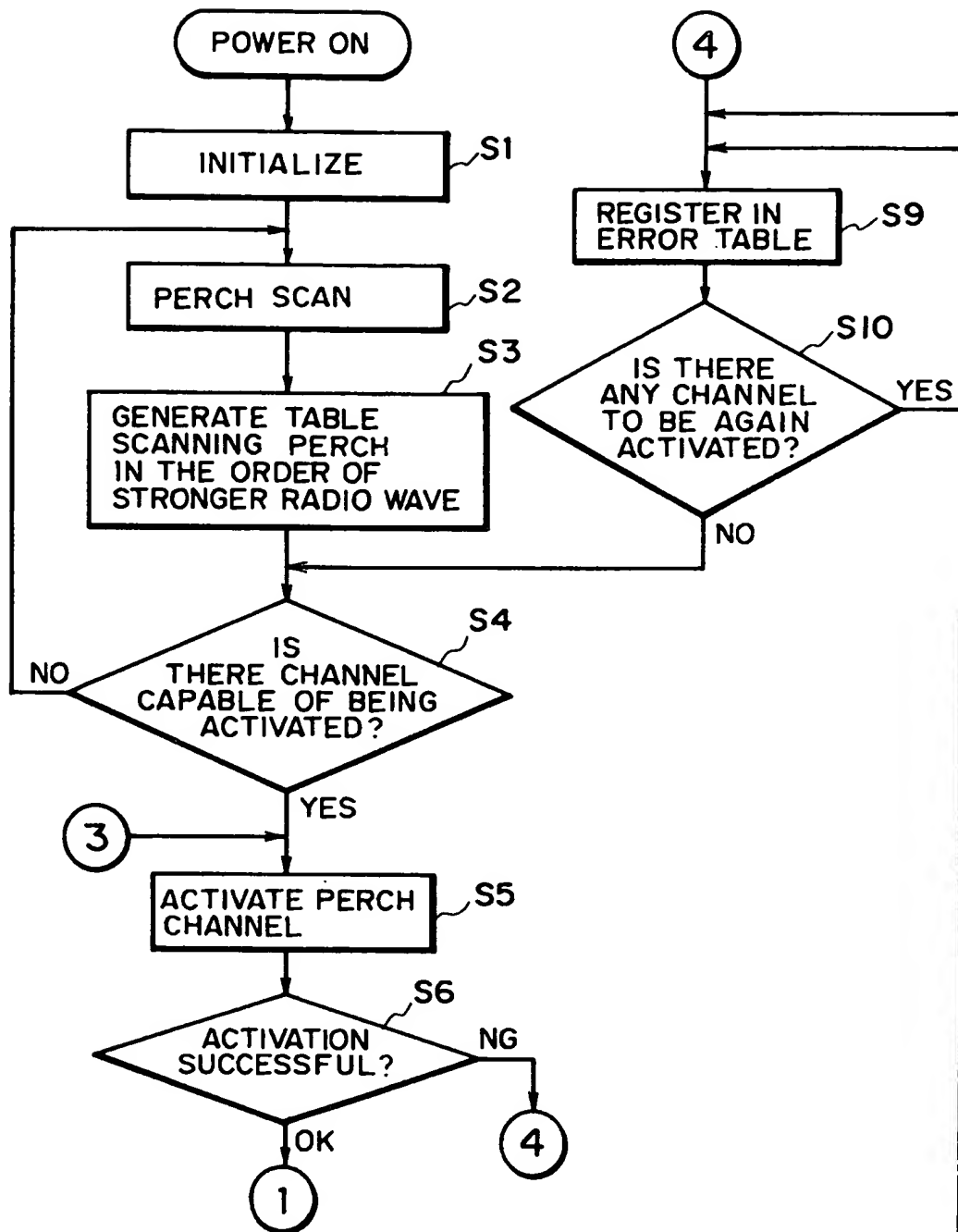


FIG. 1A

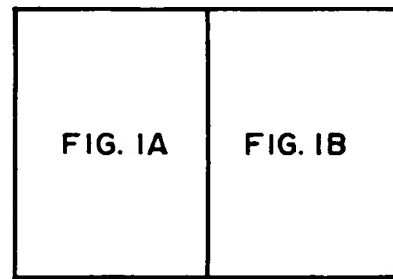
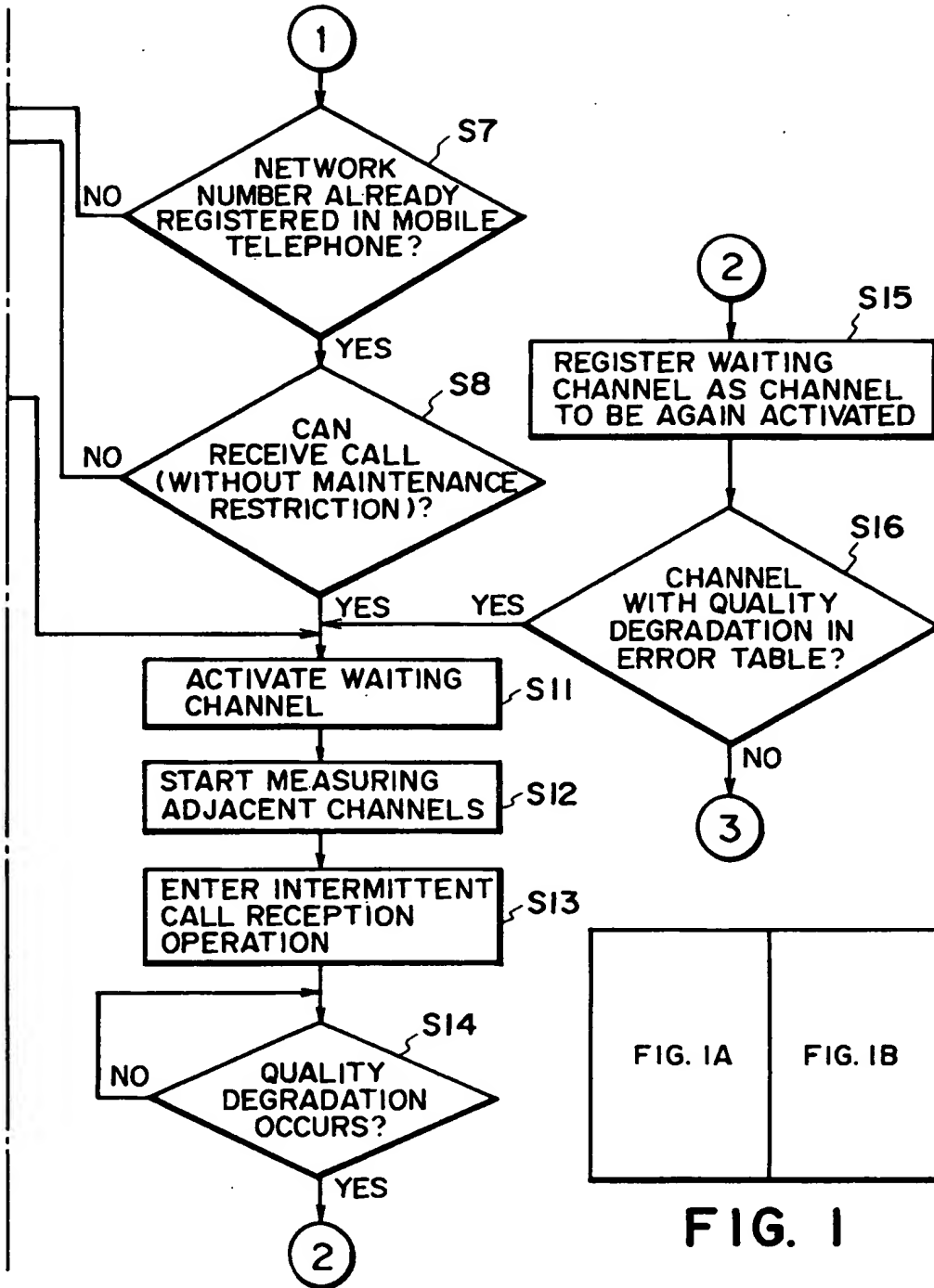


FIG. 1

FIG. 1B

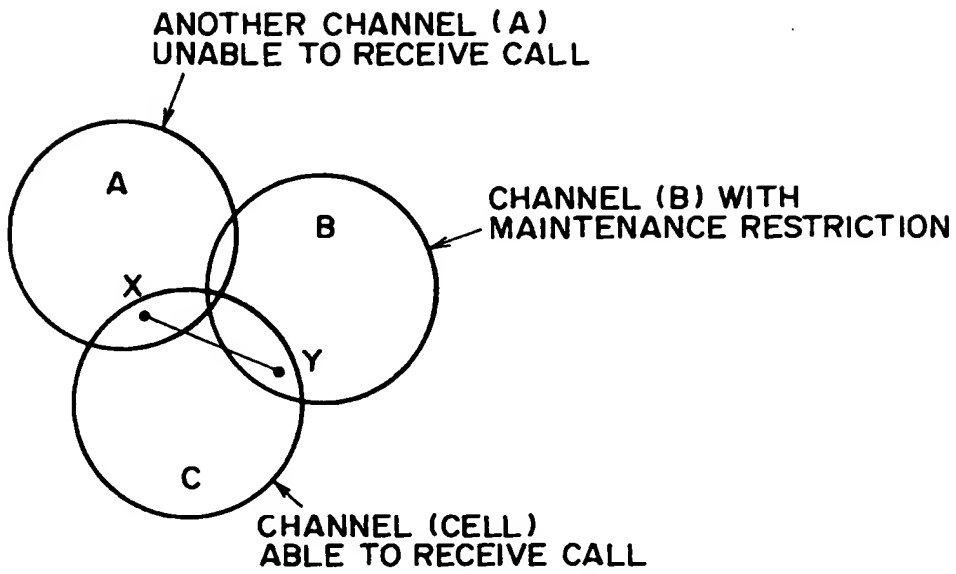


FIG. 2

FIG. 3

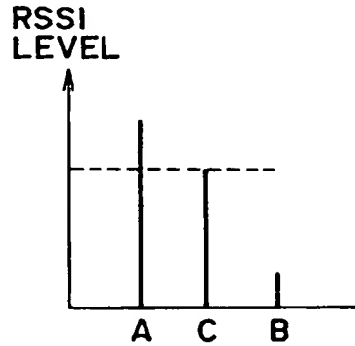
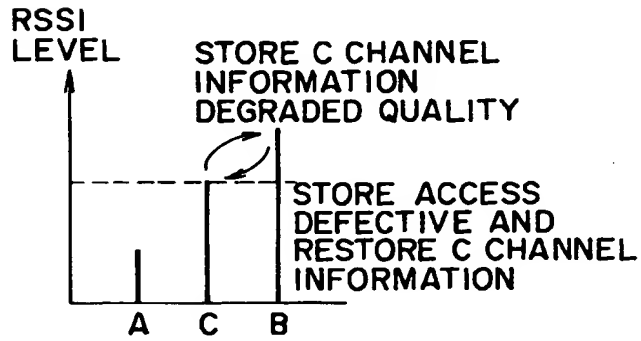


FIG. 4



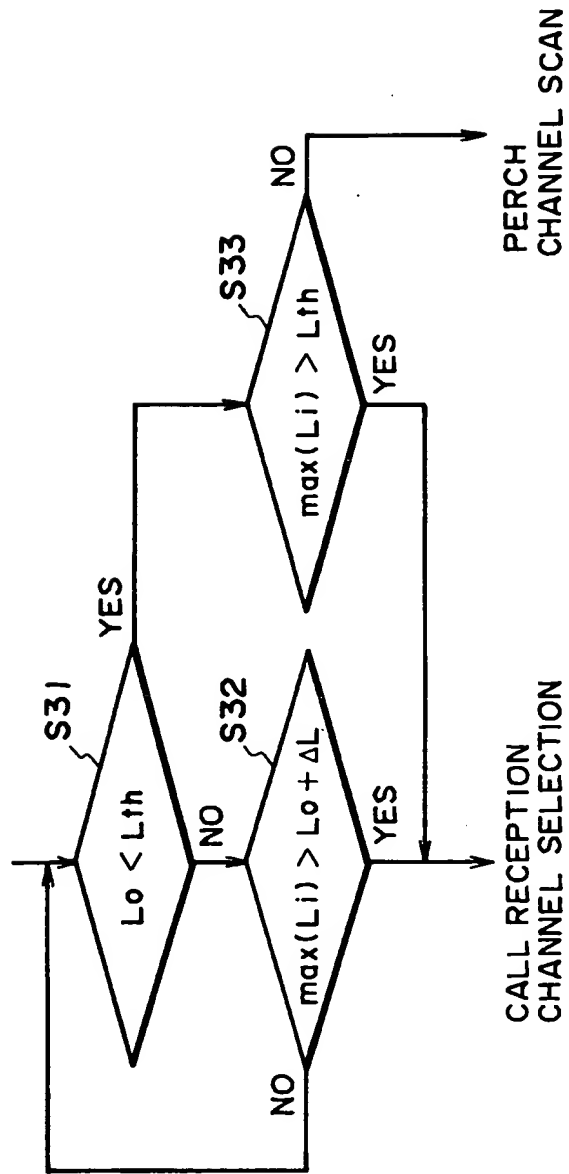
ZONE TRANSFER  
PROCESS FLOW

FIG. 5